

THE DEPARTMENT OF SURGERY

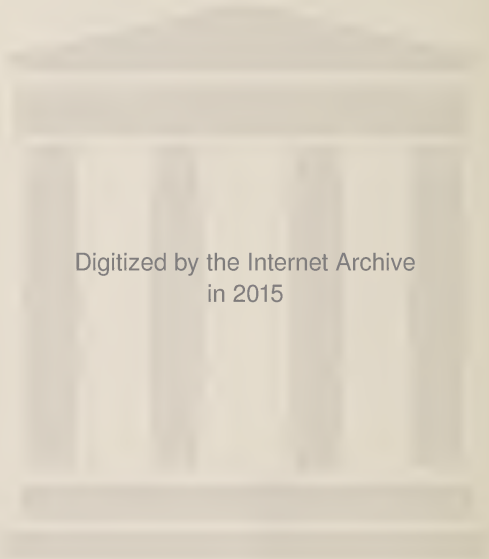
of the

New York Hospital and Cornell Medical College

A Study of Five Years' Experience

by

George J. Heuer, M. D.



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A STUDY OF FIVE YEARS' EXPERIENCE

by

GEORGE J. HEUER, M. D.

On September 1, 1937, the Surgical Department of the New York Hospital and Cornell Medical College completed the 5th year of its existence. Largely for his own benefit but also to inform others of its purpose, ideals and needs, the Director of the Department has made this study. It is a study of the facilities which the combined institutions offer for surgical work; of the care of patients with surgical diseases in the wards of the hospital; and of the educational and research programs which thus far have been carried out. It has served more clearly to indicate the directions along which the Department should develop.

1. FACILITIES OF THE DEPARTMENT. These may conveniently be described under Hospital, Out Patient and Laboratory facilities. Only those are considered as pertain to the care of ward or pavilion patients, to teaching and research.

(a) HOSPITAL. The Surgical Department is housed in the main or central part of the unit and occupies the 5th to 10th floors inclusive. The 5th, 6th and 7th floors are given over to General Surgery, including, at present, Orthopedic Surgery; one half of the 8th floor to Ophthalmology and Otolaryngology and the 9th floor to Urology. The 10th floor houses the operating rooms which serve the floors below. Each surgical floor has 58 beds equally divided among male and female patients. General Surgery has 164 beds, Urology 30 beds*, Ophthalmology and Otolaryngology 29 beds and Orthopedic surgery 10 beds. There are then, at present 233 surgical beds available for teaching purposes. Two surgical

wards still remain unopened, a ward of 29 beds on the 8th floor reserved for Orthopedic surgery and a Childrens' surgical ward of 23 beds. The latter, when opened, will become a mixed surgical ward serving General surgery and the Specialties in Surgery. With the opening of these two wards, the surgical department will provide 285 ward or pavilion beds for the care of patients, teaching of undergraduate and graduate students and the prosecution of clinical research.

The arrangement and equipment of the individual wards or pavilions are first class. Each is subdivided so as to provide one 16 bed ward, two 4 bed rooms, one 2 bed room and 3 single rooms; an arrangement which makes possible the housing of patients according to the kind and severity of their illness. Each is a complete unit with offices, dressing rooms, serving kitchen, utility and drug room, baths and so forth. Each floor of two pavilions is provided with one student clinical laboratory and one intern and staff laboratory. Nursing service is excellent and in proportion of 1 nurse to 4 patients. Special nursing is provided. Special equipment, as oxygen tents and so forth, is available.

OPERATING ROOMS. The entire 10th floor of the central building is devoted to operating suites and the sterilizing unit. The north wings contain two operating rooms each, with separate anesthetizing and sterilizing rooms and a joint scrub-up room. These four operating rooms, particularly, are used for teaching purposes; they are equipped with observation stands which may be entered from a mezzanine floor above. There are 8 other operating rooms arranged in pairs between which are anesthetizing and sterilizing rooms. All units are equipped with air-conditioning, direct and alternating electric current, negative and positive air pressure and the most efficient lighting devices. A large amphitheater for clinics and lectures occupies one end of the floor and accommodates about 150 persons in raised seats. At the opposite end of the floor are the preparation rooms; in one all supplies such as dressings, linen and gloves for the entire surgical department are wrapped, labelled and sterilized. In another the solutions used throughout the hospital are mixed, labelled and sterilized; between them are the large high pressure sterilizers.

* In addition the Brady Urological Foundation has 18 pavilion beds which its Director makes available for teaching purposes.

The rooms on this floor facing South accommodate instrument storage, supply storage, offices and the laboratory for frozen sections maintained by surgical pathology.

THE FOLLOW-UP DEPARTMENT. The department of surgery maintains a "Follow Up" service for the accumulation of data concerning surgical patients discharged from the hospital after operation. The organization is excellent so that a high percentage of all patients discharged from the pavilions returns to the hospital periodically for reexamination by members of the senior and resident staffs. The information so accumulated is transferred to, and becomes part of the hospital records.

(b) **OUT PATIENT DEPARTMENT.** The Surgical Out Patient Department occupies 5 floors (5th to 9th inclusive) corresponding with the hospital pavilions. The 5th and 6th floors are devoted to General Surgery, the 7th to Orthopedic Surgery and Fractures, the 8th to Ophthalmology and Otolaryngology and the 9th to Urology. Pavilions and O.P.D. are separated simply by a corridor so that surgeons working on the Urologic ward, for example, may walk directly into the Urologic O.P.D. The various floors of the Surgical O.P.D. consist of a waiting room for patients, cubicles for history taking and physical examinations, minor surgery operating rooms, dressing rooms and so forth. For the present clientele of the Surgical O.P.D. the space and equipment are both adequate and satisfactory.

EMERGENCY PAVILION. On the ground floor and located on a court with an ambulance entrance is the emergency unit which offers the community 24 hour service, receiving and caring for emergency cases at all times. Patients coming for examination and admission when the Out Patient Department is closed are cleared through this unit, as are consultations with other departments, compensation cases and sick employees. There is bed space for 12 and examining space for 9 patients at a time. An operating room fully equipped, stands ready for accident treatment. The hospital maintains sleeping quarters on this floor for the surgeon on duty.

(c) **LABORATORY FACILITIES.** (a) The laboratory of **EXPERIMENTAL SURGERY** occupies the 6th floor of Building C,

the 7th floor of Building C and the West wing of Building F. The 6th floor originally provided 12 research laboratories, a preparation and sterilizing room, a men's and women's dressing room and store rooms. The West wing of Building F provides a large operating room with 3 operating tables, a smaller operating room, a preparation room and sterilizing room, 2 offices, 1 large and 2 small laboratory rooms and an X-ray and dark room. The 7th floor of Building C provides animal quarters, a kitchen and wash room, an autopsy room and men's and women's dressing rooms. Due to pressure for more space from various departments, not only have changes been made in the original plant, but space has been assigned to various departments whose own original space has proven inadequate. As a result, Surgery now retains but 5 of the 12 research laboratories on the 6th floor of Building C and about one-third of the space on the 7th floor of Building C for animal quarters. At present, then, the laboratory consists of the unit on the 7th floor of Building F, 5 research laboratories with preparation and sterilizing rooms on the 6th floor of Building C and animal quarters sufficient to house 74 dogs and perhaps 100 small animals. The research laboratories and operating rooms are well equipped for their purposes; the space for animal quarters is inadequate as will be pointed out.

(b) **THE LABORATORY OF SURGICAL PATHOLOGY.** The laboratory of **SURGICAL PATHOLOGY** originally occupied the South half of the East wing of the 6th floor of Building F. It has since expanded into one of the large laboratories of the North half of the same floor and building. It consists of a large technician's room, 2 laboratory rooms, a museum room and an office. It is well-equipped. In conjunction with it is a large laboratory on the 10th floor (operating rooms) which receives all fresh material from the operating rooms, and is used for demonstration of fresh material, and for frozen section diagnosis. Surgical pathology is a subdepartment of Surgery although it cooperates with the department of General Pathology in the Hospital and Medical College. In the 5 year period it has described, diagnosed and recorded 12,558 pathological specimens. All of this material, as fresh tissue and as permanent gross and microscopic specimens is available for teaching purposes.

CHEMICAL AND BACTERIOLOGICAL LABORATORIES. Ample laboratory space for routine and research work in chemistry and bacteriology is available in the department. The laboratories are provided with chemical tables, hoods and other necessary permanent equipment. Certain other equipment is lacking. The laboratories have never been put into operation because of lack of funds.

(c) CLINICAL LABORATORIES FOR STUDENTS AND STAFF. Until recently the 5th and 6th surgical floors had in operation 2 student and 2 staff laboratories, the 7th, 8th and 9th floors each 1 large laboratory used by students and staff. In addition to these there is 1 clinical laboratory which serves the O.P.D. In the interests of economy, the clinical laboratories on the 5th and 6th floors recently were reduced to 1 student laboratory and 1 staff laboratory. The clinical laboratories for students and staff are well-equipped for urine and gastric analyses, blood studies, stool examinations and so forth.

Other facilities available to the Surgical department include the central laboratory for bacteriological and serological work, the X-ray department and the Physiotherapy and Heliotherapy departments. These will not here be described; but it should be said that they are admirably equipped and manned to serve their various purposes and offer the fullest cooperation in caring for patients.

THE ORGANIZATION OF THE DEPARTMENT AND THE STAFF. The department of Surgery is divided into General Surgery and the Specialties of Surgery - Urology, Orthopedic Surgery, Otolaryngology and Ophthalmology. All divisions function under the direction of the Head of the Department. While the Specialties in Surgery function under the Head of the Surgical department, each has a directing head who is made responsible for its organization, care of patients, teaching and research. The hospital staff consists (as of July 1, 1937) of 118 members. Of these 10 are consulting surgeons, 60 are on the attending staff and 46 are surgeons to the O.P.D.. Of the various divisions of the department, General Surgery has 35 active members on its staff; Urology (2 services) 34; Otolaryngology 19; Orthopedic Surgery 10 and Ophthalmology 10. In addition there are 18 residents and assistant residents and 9 interns who live in the hospital. Finally, there is a surgical pathologist and

a surgeon in charge of the Accident and Emergency Ward. The surgical teaching staff of the Cornell Medical College consists of 92 members. Of this number, 18 are inactive with respect to teaching and 8 teach at hospitals other than the New York Hospital. General Surgery has 18 men of professorial rank of whom 6 are inactive and 5 teach at other hospitals; 3 who have the title of Associate in Surgery, 16 who are Instructors in Surgery and 20 who are Assistants in Surgery. Urology has 3 men of professorial rank, 8 Instructors and 1 Assistant; Orthopedic Surgery has 2 men of professorial rank and 3 instructors; Otolaryngology 2 men of professorial rank and 6 Instructors and 5 Assistants and Ophthalmology 2 men of professorial rank, 1 Instructor and 1 Assistant. While there are exceptions to the statement, it is generally true that the men who are actively engaged in the care of patients in the hospital and O.P.D. are those who are actively engaged in teaching.

Of the professional and teaching staffs of the combined institutions, 7 receive salaries, spend their entire time at the institution and do not engage in remunerative practice. These are the so-called "full time" members of the department. Of these 7, one devotes his time to surgical pathology and 3 devote themselves solely to the laboratory of Experimental Surgery. To these may be added the Resident staffs who are full time members of the department in the sense that they devote themselves solely to the institution in which they live. The remaining members of the professional and teaching staffs are part time members, meaning by that term that they devote a part of their time to the hospital and medical College and engage in surgical practice. Of these 14 receive salaries or honoraria for their services. It will be seen that in the department of surgery there are few full time men in comparison with part time men. A majority of the staff in General Surgery and the entire staff in the Specialties of Surgery are part time men.

2. CARE OF PATIENTS IN THE HOSPITAL AND O.P.D. Exclusive of Semiprivate and Private patients the Surgical Department, in its five year period, has cared for 17,165 patients in the hospital pavilions, 85,025 patients in its Out Patient service and 34,160 patients in its accident and emergency pavilion - a total of 136,350 patients. The ambulant patients coming to the O.P.D. and accident pavilion made 328,604 visits to these units; the hospital patients made 12,996 return visits

to the Follow-Up department. Subdivided according to the major branches of Surgery, General Surgery including Orthopedic Surgery, cared for 12,957 hospital patients and 39,414 O.P.D. patients (134,411 visits); Urology, 1711 hospital patients and 10,426 O.P.D. patients (75,229 visits); Otolaryngology, 2226 hospital patients and 21,409 O.P.D. patients (68,495 visits); and Ophthalmology 271 hospital patients and 13,749 O.P.D. patients (33,608 visits).

In the hospital operating rooms on the 10th floor, during the same period, 17,288 surgical operations were performed; and in the operating rooms of the surgical O.P.D. 1655 minor surgical operations were performed. In performing these operations and in the reduction of fractures and other surgical procedures, a total of 22,921 anesthetics were administered.

All of this material and experience has been available to our undergraduate and graduate students.

The above represents numerically the service rendered by the department. But more important is the quality of the service rendered. I have, in my yearly reports, by a careful study of the various factors which enter into the care of patients with surgical diseases, attempted to bring out the quality of our service; and reference to these may be made by those interested. To set forth here a detailed study of the department with reference to the care of patients would extend this report unduly. But indices of the quality of service are, first, the safety of a department's surgical treatment and, secondly, the results of surgical treatment. They are determined to some extent by the skill and judgment of the surgeon, the perfection of his and the institution's surgical technics, the skill in the administration of anesthesia, the quality of the pre- and post-operative treatment and the excellence of the nursing care. Some statements, then, regarding the primary mortality in operations for surgical conditions, the incidence of postoperative infections, the complications following the administration of anesthesia and the results of treatment may serve to suggest the quality of service. Other factors of importance in treatment are included in it - the attitude and conduct toward the sick of hospital officials and professional and nursing staffs which tend to eliminate worry, fear and unnecessary pain, the provision of excellent food, of cheerful, attractive surroundings. These last may be measured by the number of satisfied patients who leave the hos-

pital. The following statements, with the exception of those relating to anesthesia, refer to General Surgery.

In the 5 year period, 12,957 patients with general surgical conditions were admitted to the surgical pavilions. Of this number 2577 were not subjected to operation either because operation was not indicated or because operation was refused. This group includes patients with a great variety of conditions; those which could successfully be treated without operation, those which might better have been treated by operation which, however, was refused and those which were so advanced or of such nature that operation could not be contemplated. Of the 2577 patients, 1488 were discharged from the hospital and 89 died. This is a mortality percentage of 3.4. An analysis of the deaths shows that 36 deaths occurred as a result of serious traumatic conditions, 20 as a result of advanced cancer, 12 from gastrointestinal diseases, 4 from diseases of the gallbladder and biliary ducts, one from intrathoracic disease and 16 from a variety of miscellaneous conditions. Of the 12,957 patients admitted, 10,380 were subjected to 11,450 surgical operations. Following operation there were 326 deaths which, regardless of the cause or of the time, are counted as postoperative deaths. This is an operative mortality of 2.8 percent, a case mortality of 3.1 percent. An analysis of the deaths shows that 76, or 23.3 percent of the deaths occurred in acute emergency conditions; 77, or 23.6 percent, in cases of cancer; 34, or 10.4 percent, in brain conditions; 21, or 6.4 percent in chest conditions; 12, or 3.6 percent in diseases of the thyroid gland; 26, or 7.9 percent, in diseases of the gallbladder and bile ducts; 30, or 9.2 percent in diseases of the gastrointestinal tract and 50 or 15.3 percent in a great variety of miscellaneous conditions.

A further analysis of some of the surgical diseases for which operation was performed indicates the distribution of the mortality in surgical conditions. It shows that 1673 patients were operated upon for appendicitis with 20 deaths, a mortality of 1.2 percent; 1049 patients were operated upon for hernia (all varieties) with 4 deaths, a mortality of 0.38 percent; 793 patients were operated upon for diseases of the thyroid gland with 12 deaths, a mortality of 1.5 percent; 1017 patients were operated upon for noncancerous diseases of the rectum and anus with 1 death, a mortality of 0.09 percent; 724 patients were operated upon for noncancerous diseases of the gallblad-

der and bile ducts with 22 deaths, a mortality of 3 percent; 320 patients were operated upon for brain and spinal cord conditions with 34 deaths, a mortality of 10.6 percent; 394 patients were operated upon for intrathoracic conditions including those of the heart with 24 deaths, a mortality of 6 percent; and 687 patients were operated upon for cancer in its various forms and locations with 77 deaths, a mortality of 11 percent. It will be observed that the surgical diseases which contributed to the greatest mortality are the acute emergency conditions, cancer in its various forms and surgical diseases of the brain and spinal cord.

SURGICAL TECHNIQUE. POSTOPERATIVE INFECTIONS. An index of a department's surgical technique may be obtained by a study of clean surgical wounds in which silk has been used as ligature and suture material. By a "clean" surgical wound is meant one made through normal skin for the treatment of a surgical condition which is not associated with infection. Aseptic surgical technic implies the exclusion of bacteria from a surgical wound; and if, because of imperfect technic they are introduced into a wound in which silk is used, an infection in the wound is most likely to arise. A study, then, has been made of 2550 operations involving clean surgical wounds in which silk has been buried. They include operations for hernia, goiter, nonsuppurative appendicitis and radical operations for cancer of the breast. Following the 2550 operations there were 30 wounds which by rigid criteria are considered as infected; an incidence of 1.1 percent. It is interesting to note that in 1049 operations for hernia there was no serious infection, all being slight and in the superficial tissues. In the 8 infections which occurred in 793 operations for goiter, all except 2 occurred in cases which were drained at operation. In operations upon the breast for cancer, only those are included in the study which were radical operations, a serious test of one's technic because of the tremendous size of the wounds. In this group there was an incidence of infection of 2.4 percent, the highest in the series. While it is true that these infections prolonged convalescence, in only one instance was infection the cause of a fatal outcome.

ANESTHESIA. In the 5 year period, 22,921 anesthetics were administered to pavilion and O.P.D. patients. The anesthesia

included 15,744 inhalation anesthetics, 5022 local, 1761 spinal, 156 caudal and 30 colonic ether. Avertin was used as a sole anesthetic in 162 cases but was used as a basal anesthetic in combination with other anesthetics in over 1000 cases. The latter are included in the various classifications above. During the period the anesthetic was being administered 9 patients died. Of the deaths, 4 must be attributed to the anesthesia, 4 are clearly not due to anesthesia and 1 is questionable. The death in question occurred in a patient about to be subjected to an exploratory thoracotomy for a large intrathoracic tumor under novocaine. Just as the infiltration of the thoracic wall was completed, the patient had a series of convulsive seizures and died. The picture was similar to that described under pleural reflex or pleural eclampsia; yet there remains the question whether death was not due to novocaine intoxication. If it is included as an anesthetic death, there were 5 in 22,921 anesthetics, an incidence of 0.02 percent. Of the 5 deaths 2 were the result of inhalation anesthesia (incidence of 0.01 percent), 2 of spinal anesthesia (incidence of 0.1 percent) and 1 of local anesthesia (incidence of 0.01 percent).

It has been customary in studies of anesthesia to include the postoperative pulmonary complications. It is reasonable to suppose that anesthesia, particularly inhalation anesthesia, is a factor in the causation of these complications; but it is very difficult to know when and when not to blame the anesthetic for them. Certain it is that they occur in hospitalized patients in medical and surgical wards who have not received an anesthetic. Unfair as it may seem, we have attributed all postoperative pulmonary complications to anesthesia. This is rather hard on the anesthetists but at the same time, it stimulates their best efforts and produces for me each year the most exhaustive study of anesthesia and its complications. A particularly careful study was made during the past year of 16,616 anesthetics administered between September 1, 1933 and January 1, 1937. In this series there were 171 postoperative pulmonary complications, an incidence of 1 per cent. Forty-six patients with such complications died, a mortality rate of 0.28 percent. A review of the literature between 1906 and 1937 shows that both the incidence and the mortality were as low as recorded either in this country or abroad. An analysis of the 46 deaths occurring as a result of postoperative pulmonary complications shows

that 31, or 67.4 percent, were due to pulmonary embolism and infarction, 11, or 23.9 percent to bronchopneumonia, 3, or 6.5 percent to lobar pneumonia and 1, or 2.1 percent to pulmonary abscess. The importance of pulmonary embolism as a cause of death has stimulated some clinical research aiming at its prevention which subsequently will be reported.

RESULTS OF TREATMENT. It is usual for patients, on discharge from the hospital, to state that they are improved; and it is true that the great majority of patients are both subjectively and objectively improved. It cannot, however, be foretold at the time of discharge that the symptoms for which they were treated or the pathological lesions which were removed will not later return. Only by a study of the late results can the efficacy of surgical treatment be determined. This is the reason why the surgical "follow-up" service should be one of the best organizations in the department; for it, by following patients discharged from the hospital, enables us to determine the results of our surgical treatment.

The determination of results is a laborious undertaking. It involves the assemblage of large groups of patients who have been treated for the same surgical disease and must be induced to return to the hospital for examination over an extended period of time. Patients with cancer, for example, are not considered cured until it is known that they are free from any evidence of the disease at the end of 5 years. In other surgical diseases, such as appendicitis and hernia, relief of symptoms or absence of return of the condition after a lesser period of time is taken as evidence of a final result.

From the above it will appear that we cannot as yet state the final results in all the patients treated in the first five year period; for not only has not a sufficient time elapsed in some conditions to determine the result, but in others in which results can be determined, the studies have not yet been completed. But such studies are going forward actively and a fair number have been published. A few statements from some of them, dealing with the common surgical diseases, will suffice to indicate the results obtained.

In a study of 1373 cases of appendicitis subjected to operation, 866 are cases of acute appendicitis and 487 are cases of chronic appendicitis. In the 886 cases of acute appendicitis the disease was, of course, terminated by primary operation. The

late results from the viewpoint of disabilities are excellent. Certain late manifestations, the result of the drainage of wounds and of adhesions, the result of appendiceal abscess or peritonitis may still be anticipated in a small proportion of cases. Of 487 cases of chronic appendicitis, a disease notoriously difficult correctly to diagnose, 345 have been successfully followed and of these 65 percent are completely free from symptoms, 16 percent are improved and 19 percent unimproved. In this group, incorrect diagnosis was a greater factor in the unimproved than surgical treatment.

In a study of our first 500 cases of hernia followed for from 6 months to 2 years after operation, we find that 100 percent of 69 umbilical and postoperative ventral herniae with complete follow-up records are cured (no recurrence of condition), 97.7 percent of 253 indirect inguinal herniae are cured, 93.8 percent of 32 direct inguinal herniae are cured, 89 percent of 26 femoral herniae are cured and 85.8 percent of 14 epigastric herniae are cured.

In a study of 793 cases of goiter, the results in 491 which are simple goiters or goiters with mild or moderately severe toxic symptoms are excellent. Chief interest, however, attaches to 302 cases of advanced Graves' disease, all of which had typical histories of the disease, enlarged thyroid glands, elevated basal metabolic rates, tachycardia and loss in weight. These have been studied over a sufficiently long period after operation. Of the 302 cases there has been a return of symptoms in 20, or 6.6 percent. In 10, or 3.3 percent, symptoms of thyroid deprivation have appeared; these, however, being perfectly controlled by appropriate therapy.

These late results are satisfactory. They are capable, however, of improvement.

I should not leave the subject of care of patients in the New York Hospital without referring to the department's informal relations with other institutions. The surgical department sees in consultation, patients with surgical conditions at the Hospital of the Rockefeller Institute and when operative therapy is indicated cares for them in the New York Hospital. This relationship is advantageous to both institutions. From the viewpoint of the surgical department, it adds to the interesting clinical material in the surgical pavilions and permits participation by members of the staff in clinical research. From the view-

point of the Rockefeller Institute it offers the services of a highly organized department for the care of its patients and secures for it surgical procedures desirable for the prosecution of its clinical research problems.

The care of patients in the surgical O.P.D. is as nearly identical with that in the hospital as circumstances permit. The staff which cares for O.P.D. patients is, with few exceptions, the same as that which cares for patients in the hospital. As a result the same care in diagnosis, in treatment, in technic, in anesthesia and in the promotion of wound healing prevails. With an appreciation of the conditions under which ambulant patients come to the O.P.D. an attempt has been made to render prompt and efficient service. It can be said that no patient coming to the surgical O.P.D. is turned away without being seen and advised regarding his condition.

TEACHING. EDUCATIONAL PROGRAM. An educational program has been developed for two main groups of students - undergraduate and graduate. It provides also for the training of surgical interns. The facilities and material have been indicated in preceding pages. Five years' experience has shown that both for undergraduate and graduate teaching the pavilion beds in surgery should be kept as nearly full as possible. For the sake of clearness, the undergraduate, intern and graduate teaching programs will be described separately.

1. UNDERGRADUATE TEACHING. JUNIOR YEAR.

(a) **GENERAL SURGERY.** The medical student at the New York Hospital and Cornell Medical College begins his clinical activities in his third year, one trimester of which he devotes to surgery. Since a class may number 60 to 75 students, from twenty to twenty-five are assigned to surgery and act as clinical clerks on the three surgical teaching pavilions. This represents a proportion of 1 student to 7 or 8 surgical beds. In the capacity of clinical clerks, the students take histories, make physical examinations and carry out work in the laboratory for the patients assigned to them under the direction of the resident staff. Their histories are read, criticised and corrected by members of the resident staff assigned to this duty. The physical examination of patients follows a definite routine and the findings are checked by staff members; omissions are pointed out and corrections made and the student's report although not

official, may be incorporated in the hospital record. The laboratory work consists in routine studies of blood and urine and in the performance of such special tests as gastric analyses for which he has been trained in clinical pathology.

As clinical clerk the student comes in contact with the patients assigned to him; he follows their course from admission to discharge; he attends the operations performed, studies the pathology of the lesions, assists with dressings and notes the postoperative complications which may occur. He observes and takes part in more complicated and specialized procedures executed for the purpose of arriving at a correct diagnosis; and follows the pre- and postoperative treatment.

His opportunity for observing surgery and partaking in discussions of surgical diagnosis and therapy is extended by ward rounds which he attends for an hour four days a week during the entire trimester. Cases are presented by the students and the specific problems of each are discussed by them and members of the senior staff. Conferences also are held on wound healing, pre- and postoperative treatment and so forth.

OPERATIVE SURGERY. A course in operative surgery has been designed to give the student in his third year, an opportunity to become familiar with the principles of surgical technic and to perform operations himself. The course consists of eleven exercises of 3 or more hours one morning a week during the first trimester. The class of students is divided into surgical teams of five; each of the five rotating in the positions of surgeon, first assistant, second assistant, anesthetist and family physician. Under the supervision of an instructor, each group carries out eleven of the commoner operations on living animals. The student becomes familiar with surgical instruments, their care and sterilization; with suture material and its use and with knot tying. He learns how to prepare his hands for operation and to don sterile gowns and gloves. The technic of sterilizing the skin and of applying sterile drapes around the operative field is taught him. Under guidance of an instructing anesthetist, one of the team administers ether, recording the animal's response to the drug, the pulse rate and respiration, the general condition at the end of the operation and finally, the postoperative orders prescribed by the operator. The postoperative course of each animal is closely followed by the family physician of each team and in the end the animal is sacrificed

so that the student may see the effect of his surgery. A complete protocol of each animal must be handed in by the students at the end of the course.

This teaching exercise takes place in the laboratories of Experimental Surgery. The equipment is very complete and allows for aseptic technic of a high order. An instructor for each table, stands by to criticise technic, answer questions and, in general, to prevent serious errors. Great stress is laid upon careful handling of tissues, the control of hemorrhage and the healing of wounds. Aside from its intrinsic value, the course prepares the student for further experience in the administration of anesthesia in the operating rooms, and for surgical and other procedures involving aseptic technic in the wards and out patient department.

SURGICAL PATHOLOGY. One morning a week the group of students meets in the surgical pathological laboratory. An hour is devoted to examining the current microscopic material from surgical cases; one hour is given to gross preparations of the same material and one to the presentation of unusual pathological specimens, as a basis for discussion of various types of lesions and their pathological and surgical significance. By this means surgical pathology is taught in its direct application to patients. The student is expected to study the gross and microscopic preparations of material he has seen removed at operation from cases under his care on the pavilions.

(b) **THE SPECIALTIES. ORTHOPEDIC SURGERY.** Alternate afternoons for a three week period are spent studying orthopedic conditions and fractures on the pavilions. Formal exercises on the important orthopedic diseases and their treatment and on the treatment of fractures are given by members of the orthopedic staff.

UROLOGY. One morning a week during the surgical trimester is devoted to the study of urological diseases. A member of the senior staff of urologists instructs the students for one hour in the pathology of the genitourinary tract, showing specimens and describing the associated clinical pictures. A formal talk by the head of the department on one of the major surgical diseases follows and the third hour is spent on ward rounds with the resident staff observing the methods and results of urologic surgery.

OPHTHALMOLOGY. During the third part of the second year the entire class receives a series of formal exercises in Ophthalmology and Ophthalmological pathology describing such important diseases as uveitis, glaucoma, intraocular tumors, injuries and simple ophthalmia. This instruction is supplemented by exercises on the pavilions and in the Out Patient Department.

OTOLARYNGOLOGY. Clinical lectures on diseases of the ear, nose and throat with the presentation of illustrative cases are given by the head of the department. The anatomy of the head is rehearsed and special instruction given in the manner of examining the upper respiratory tract and ears. A period of service as clinical clerks on the otolaryngological pavilion is included in the course.

SURGICAL CLINICS. A surgical clinic is given one day a week for junior and senior students by the Head of the Department of Surgery throughout the entire school year. Groups of cases are discussed which illustrate surgical diseases, their variations and complications; unusual cases are demonstrated; and surgical diagnosis, operative indications and results of surgical treatments are presented. The clinics are informal and the students are asked to participate in them. References to the literature are frequent and the student is stimulated to read various classics on the diseases.

SUMMARY. At the end of the third year in medical college, and his first year in clinical surgery, the student has been instructed in history taking, physical examinations and the commoner laboratory diagnostic measures. He has seen and participated in special diagnostic examinations made with the ophthalmoscope, proctoscope, laryngoscope, bronchoscope and oesophagoscope. He has observed the preparation for operation; has witnessed the operation, the postoperative care and the dressings. He has observed living pathology in the operating room and its gross and microscopic appearance in the laboratory of surgical pathology. He has had a brief sojourn in the special subdepartments of surgery and has attended formal lectures on various special diseases. He has had training in operative surgery on animals sufficient to give him dexterity in handling instruments, some experience in the administration of anesthetics and an appreciation of living tissues. He has studied

wound healing. He has been encouraged to read surgical texts and surgical journals.

SENIOR YEAR. GENERAL SURGERY. In the senior year a quarter of the school year is devoted to surgery. The teaching takes a slightly different form; on the principle of permitting the student to assume responsibility commensurate with his ability, he is placed in positions which require him to rely to a certain extent upon his own judgment. He is assigned for two weeks to work in the operating rooms where he is instructed in anesthesia and himself gives 5 to 15 anesthetics under supervision. He becomes familiar with the technic, methods and organization of the operating teams; watches operations and is shown the sterilization and use of instruments and dressings. He spends three weeks in the Out Patient diagnostic clinic where he acts in the capacity of the patient's doctor. The Chief of the clinic reviews the history he has taken, confirms his physical findings and consults with him regarding the disposition of his patients. This experience resembles office practice and permits the student to apply the knowledge he previously has acquired. Three weeks are devoted to work in the surgical dressing clinic in which the student does dressings on patients discharged from the hospital and takes care of minor injuries. His experience during this period comprises a large number of surgical dressings, assisting at minor operations and performing a varying number himself.

His afternoons are devoted to the Specialties in surgery. Besides the formal talks by members of the senior staff, the student is instructed in the Out Patient department of each specialty.

UROLOGY. The class is divided into small groups which rotate through the department. Over a period of approximately 3 weeks they have afternoon sessions of three hours each in the Out Patient department. The use of different urological instruments is demonstrated, and they receive specific instruction in handling acute urinary infections, in making cystoscopic examinations, in interpreting pyelograms and in the general treatment of urological conditions.

OTOLARYNGOLOGY. The students in this group are assigned to the Out Patient department where they take histories and make physical examinations on patients with diseases of the ear, nose and throat. They have an opportunity of observing

operations and following the cases on the pavilions. They become familiar with the use of instruments as the otoscope, laryngoscope, bronchoscope and oesophagoscope. During this period special topics are presented to the class by various members of the teaching staff.

OPHTHALMOLOGY. During the fourth year, groups of students are assigned to the Out Patient department of Ophthalmology, and in addition have the opportunity of taking further work in this specialty in their elective quarter.

COMMENT. The teaching of surgery to undergraduate students is, by nature of the subject, very difficult. Surgery has developed into a special branch of medicine because of its treatment - a form of treatment which so often involves surgical operations. These, with the exception of some minor surgical procedures, the student cannot do, for he lacks the training to do them. The result is that the surgical department attempts to teach surgical technic (on animals), the practical administration of anesthetics, surgical pathology, surgical methods (use of ophthalmoscope, nasal speculum, otoscope, proctoscope, cystoscope, laryngoscope, oesophagoscope), surgical diagnosis, indications for surgical treatment, pre- and postoperative treatment and the care of wounds. An important part of surgery - operative treatment - cannot be taught by means of first hand experience and what is learned by the student is chiefly by observation in the operating rooms. For undergraduate teaching the facilities and material are adequate. * The quality of the teaching generally is good but certainly can be improved. Ways and means of improving it will be discussed later.

THE INTERNSHIP. Each year eight graduates of a Class A Medical College are accepted for one year as interns in the department of Surgery. * The period of training as intern may be considered as supplementary to the undergraduate course in surgery for it teaches the student the practical application of the knowledge he acquired in medical school; it may, with us, equally well be considered as introductory to an advanced

* A graph of the admissions to the surgical pavilions shows each year a "slump" in the fall months. During this period the material is scarcely adequate for undergraduate and graduate teaching. The hospital authorities are making an effort to correct this condition.

* A ninth intern who devotes himself to Ophthalmology and Otolaryngology has been added.

course in Surgery, for perhaps the majority of interns who apply for positions in surgery have already decided upon a surgical career.

The surgical intern's opportunity to acquire knowledge of general medicine in addition to a special knowledge of surgery has, in recent years, been increased and due to surgical interest in a constantly increasing number of diseases. Diseases of the brain, spinal cord and peripheral nerves, of the neck, chest, abdomen and extremities may be found in any surgical ward. Diseases long considered as purely medical have become to a greater or lesser extent surgical. General diseases as diabetes, arteriosclerosis, nephritis, syphilis and cardiac disease, I venture to say, are almost as common on a surgical as on a medical service. The surgical intern, then, does not confine his activities to a limited group of diseases formerly considered as purely surgical, but has the opportunity of acquiring knowledge of a wide variety of medical and surgical conditions.

The active duties of the intern during the year are many. He rotates through male and female wards for general surgery and through the urologic and orthopedic pavilions. In each of these wards he is in charge of patients under the supervision of the resident staff. He receives new patients, interviews relatives, discusses treatment with them and, in general, plays the part of family physician. He stands by his patients throughout their stay in the hospital, arranges for their discharge and prescribes home treatment.

Specifically he does all the preliminary work on all patients admitted. He takes and records the history, makes a complete physical examination, performs the necessary laboratory work and does, or has done, such special examinations as may be necessary for accurate diagnosis. He is required to make a tentative diagnosis which is later confirmed or rejected by the Resident or senior staffs. In consultation with his seniors he prescribes pre- and postoperative treatment and performs dressings. He is responsible for careful progress notes on the history. He assists at all operations upon his patients and studies the pathology of the lesions in the surgical pathological laboratory. He acquires further pathological experience by spending six weeks in this laboratory examining and diagnosing gross and microscopic material. Not only does the intern acquire knowledge through his own experience and reading, but he receives

instruction from the Resident and senior staffs. He is constantly associated with the Resident surgeon who helps him in all his problems; he attends the ward visits of the senior staff with the students, the staff rounds and various conferences. Realizing the status of the intern in our organization, he is our particular concern; if he chooses to leave us to pursue a career elsewhere, we are anxious that he be well prepared for it; if he remains to follow an advanced course in surgery, we are equally anxious that he have the proper foundation for it.

GRADUATE TEACHING OF SURGERY. The ideal end product of a course of graduate instruction in surgery is a young man who has had a rather broad fundamental training in the sciences related to medicine and, after his graduation in medicine, a long, thorough and comprehensive training in surgical pathology, surgical diagnosis, pre- and postoperative treatment and operative surgery; who has acquired the technic of, and become imbued with the desire to pursue research; who has gained experience in teaching and departmental organization; and who has learned the ethics of the profession. In short, he is one for whom, at the completion of his training, his surgical teacher is ready to stand sponsor either as equipped for a teaching career or as fully qualified to practise surgery.

In an attempt to meet this ideal, the surgical department of the New York Hospital and Cornell Medical College offers an advanced or graduate course in surgery to two distinct groups of men - (1) men who, after graduation from a medical college and the completion of an internship, desire to continue their education in surgery without interruption and (2) men who, after an internship have begun practice of surgery and who desire to continue their education while engaged in practice. The organization of the advanced instruction for the first group is developed around the resident system; that for the second group embodies all the features of the resident system with the exceptions that the men participating in it live outside the hospital and are allowed a reasonable amount of time for office practice. An outline of the instruction and experience of the first group will be given. Such variations in the instruction and experience pertaining to the second group will be indicated. Under both systems the predominant idea is not only to instruct the graduate student in Surgical pathology, surgical diagnosis, pre and postoperative treatment and operative sur-

gery, but also to permit him, through contact with an abundant surgical material, to gain a large personal experience with these aspects of surgery. The work is arranged so that he advances to successive positions each involving the assumption of greater responsibilities. Under both systems the culmination of the student's career is the position of resident surgeon or its analogue, a position of great importance in the surgical department. The requirement for admission to graduate work is, in all instances, the graduation from a Class A Medical school and the completion of an internship in a Class A hospital.

1. **THE RESIDENT SYSTEM.** There are two complete resident groups in the surgical department, each functioning independently and on separate floors and each consisting of a resident, a first assistant resident and five assistant residents. The first three years are spent as assistant residents, the second three in the more advanced positions of first assistant resident and resident.

THE FIRST YEAR. The first six months of the first year, the assistant resident spends on a general surgical pavilion. Under supervision of the resident, he is in charge of patients, summarizes histories and physical examinations and carries out special examinations and dressings. He assists at the majority of operations upon his patients and performs minor operations under supervision.

The second six months of the first year are devoted to surgical pathology. Under direction from the head of the surgical pathological department, the assistant resident has charge of all pathological material coming from the operating rooms. He examines gross specimens and microscopic sections, describing his findings and making a diagnosis for the hospital records. He makes frozen sections for immediate diagnosis in the laboratory on the operating room floor and assists in the preparation of museum specimens. During the medical year he takes part in a course of surgical pathology which the head of the department gives the students; he attends all conferences pertaining to surgical pathology in general surgery and the specialties. He is given an opportunity to work in the experimental laboratories, assisting members of the staff with specific problems or carrying on research of his own.

THE SECOND YEAR. The first six months of the second year are spent in the Emergency pavilion and in the surgical dressing and diagnostic clinics. This work constitutes valuable experience and carries with it considerable responsibility. Although a first assistant resident is at all times in charge, the assistant resident in this post is encouraged to rely upon his own judgment in deciding on the immediate disposition of accident cases, in recommending patients for admission to the hospital and in performing minor operations and reducing fractures. The surgical dressing clinic offers an opportunity of observing a large number of patients after discharge from the hospital as well as many minor injuries; in this respect it resembles office practice in surgery. The time assigned to work in the surgical diagnostic clinic is sufficient to acquaint the student with difficult diagnostic problems and with cooperation between different branches of medicine. He does part time work on the pavilions where he continues the treatment of, and carries out some of the operative procedures on his patients.

The second six months of the second year, the student is assistant resident on the Urologic service. His position and duties are similar to the assistant resident's on general surgery. He attends the urologic clinic and acquires knowledge of the diseases of the genitourinary tract there and in the urologic pavilions; he makes cystoscopic examinations and assists at urologic operations. He is responsible for the collection of teaching material and studies the pathological specimens from the department.

THE THIRD YEAR. The assistant resident spends six months of the third year on the private floors. This is a responsible position and brings the assistant in direct contact with the attending surgeons on active duty in the pavilions and with their private patients. He is responsible for the care and comfort of these patients during their stay in the hospital. He records the history, makes examinations, assists at the operations and supervises the pre- and postoperative therapy; in short, he supplements for the visiting surgeon in his absence and sees that his orders are carried out.

At the beginning of the second six months, the assistant resident returns to the general surgical pavilion with more experience than during his first period there and consequently with more important duties. A larger part of his time is spent in the

performance under direction of simple and major operations. He supervises the interns and does the major dressings. He has gained considerable knowledge of the management of the unit and is capable of assuming duties in any branch of the work.

The position of resident in the Surgical Research laboratories is open to one especially able assistant resident for the whole third year. In this position he is responsible to the chief of the department of Surgery for the conduct of these laboratories. This involves executive and teaching activities greater than in any position save that of resident surgeon. He assigns work, arranges operating schedules, orders supplies and equipment and supervises the care of the experimental animals. During the medical school year he assists in instructing the students in operative surgery. He takes part in the experimental work of the senior staff and has an opportunity to follow his own research problems.

At the end of the third year an assistant resident has had a fairly large and varied experience in surgery. The figures given in the following resume of his past work are based on averages for the group of men who recently have completed three years as assistant resident.

As an intern and assistant resident the student has observed and assisted in the treatment of 1800 patients in the pavilions of general surgery (including Orthopedic surgery), 200 in the pavilions of Urology and 200 on the Private floors. He has had the opportunity to see and study 5000 patients in the accident pavilion and general surgical O.P.D. He has observed 500 patients with urologic complaints in the Urologic Out Patient department and has performed from 75 to 100 cystoscopic examinations. His operative experience includes many minor and about 150-200 major operations in general surgery and 25 to 50 operations in Urologic surgery. He has reduced more than 100 fractures. This experience gained by contact with patients has been supplemented by experience in surgical pathology, experimental surgery, teaching and management. If he continues his education with us he is advanced to the positions of first assistant resident and resident surgeon.

FOURTH AND FIFTH YEARS. The first assistant resident devotes one to two years to the study of general surgical conditions on the surgical pavilions. He is responsible, under the resident, for all cases admitted to the emergency services and

to the pavilions, and participates in a limited number of consultations with other departments. He supervises the work of interns and assistant residents on the two wards of his surgical floor and selects the teaching material for the undergraduates. He acts as first assistant in a large number of operations and performs a number of more difficult operative procedures himself. In the absence of the resident, he carries the entire management of the unit.

A certain amount of leisure from his clinical duties during this period permits him to engage in clinical studies which he is encouraged to make.

FIFTH AND SIXTH YEARS. The final year and one half in the graduate student's training is spent in the position of resident surgeon, a position of great responsibility and one which requires the large experience accumulated by him in his previous years with us. The resident surgeon is in charge of his unit and is responsible to the Head of the department and his immediate associates for all matters pertaining to the conduct of his unit. He passes on all patients admitted to his section of the service, is responsible for the organization of the work on his surgical pavilions, for supervision and instruction of the assistant residents and interns and for the teaching material used for the instruction of undergraduate students.

His primary concern is the care of patients. He operates upon the larger number of the patients on his floor under the direction of the senior staff and he assigns operative work to the assistant residents on his staff and assists them in the performance of operations. He sees patients from other services in consultation and holds staff rounds with the resident staff.

The approximate clinical experience of the resident surgeon during his six or more years of training includes the care of 5100 patients; 6280 O.P.D. patients making 22,780 clinic visits and 1000 surgical consultations. He will have assisted at approximately 4,000 operations and performed about 2,000 himself; three fourths of which are major surgical operations.

2. **ADVANCED TRAINING** for the second group of men - those who have entered surgical practice but who desire to continue their surgical education and experience, differs in certain respects from that of the first group just outlined. As regards the arrangement of their work it should be noted that the men

do not live in the hospital as do those participating in the resident system. They are permitted an office practice which takes them away from the hospital 2 hours per day; they also are permitted to respond to emergency calls outside the hospital. To encourage them to spend as nearly as possible their entire time at the hospital, these men are given the privilege of caring for their private and semiprivate patients in the New York Hospital and with the knowledge that they may have the advice and assistance of the senior staff in caring for them. The bed capacity of the floor allocated to them is the same as that of each of the two resident groups as is the surgical material. Although they live outside the hospital, the men cover their service at all times through specific afternoon and night assignments at the hospital.

The first three years' work is identical with that described under the resident system with two exceptions - the men have not so far served on the private floors nor on the urologic service. That they have not is due to circumstance rather than an arranged program. The men who thus far have been accepted have pretty well determined the scope of their future and have wished to concentrate on general surgery. The program is sufficiently elastic to permit work in Urology. The extra time allocated to private service and Urology under the resident system is devoted to general surgery in the pavilions and O.P.D. and to Orthopedic Surgery and fractures.

The work in the later years is, again, identical with that described under the resident system with the exception that the period is shorter (2 years instead of 3). The period of training with this group is 5 years, with the preceding, at least 6 years. Because of this, the operative experience gained by the student is perhaps slightly less and the operative work more closely supervised. But a summary of the work and experience gained in 5 years by this group of advanced students shows that it is comparable with that of the first group.

COMMENTS. It will be observed that the courses of graduate instruction for the two groups of advanced students have somewhat different objectives. It is a responsibility of an educational institution such as ours, to perpetuate academic careers; it also is its responsibility adequately to qualify men for practice of surgery in the community. While from the viewpoint of clinical training and experience the course of instruction involved in the resident system qualifies the student for surgical

practice, one of its main objectives is to prepare men for academic careers; and through its emphasis upon and participation by the student in departmental organization, teaching and research. The second course of instruction for young men who already have gone into surgical practice primarily is designed to elevate the standards of surgical practice in the community.

The educational program outlined in preceding pages offers educational opportunities to 8 interns and 20 graduate students in general surgery; but it should be stated that in addition it offers similar educational opportunities to 2 graduate students in Urology and 2 graduate students in Ophthalmology and Otolaryngology. The further development of advanced educational opportunities in the specialties of surgery awaits the further development of these specialties; a matter to which I shall refer.

A review of the educational program convinces me that in general it is sound. Long experience in teaching surgery to undergraduate students makes it apparent that it must be limited, - that it must stop short of teaching operative surgery on living subjects. Experience also is to the effect that the internship fails to equip the student sufficiently to practice surgery. More and more widely has come the realization, long held by teachers of surgery, that a prolonged period of surgical training, best secured by organized programs of graduate instruction, is necessary properly to equip a man either for an academic career in surgery or for surgical practice. Organized medicine indicates the recognition of this belief by the creation of qualifying boards in general surgery and the specialties in surgery. It is rather the method of graduate instruction and its exact duration upon which opinion varies.

The resident system as outlined in preceding pages has been criticized chiefly on two counts, - first that it is too prolonged and second that too few of those graduate students who are accepted for instruction, complete the period of instruction. Against the first criticism may be opposed the experience of teachers of surgery who for many years have concerned themselves with the problem of the training of surgeons. This experience I gathered a few years ago and published; and it is, that a period of no less than 5 years and, in the opinion of many, preferably 6 years of intensive work is necessary adequately to train a surgeon. As a result of my own experience of some 25

years in observing and directing students under the resident system, I am convinced that the period outlined is not too long. The second criticism cannot be taken as a criticism of the system. It is quite true that all the students who begin the course do not complete it. But this is true of any educational effort. Experience has shown that an occasional student must be dropped because of lack of qualifications for the position of resident surgeon; another voluntarily withdraws because of illness, family misfortunes or other reason; still another because a favorable position elsewhere is offered him. These contingencies are recognized by us and satisfactorily covered. It will be recalled in describing the resident system that I summarized the student's training and experience at the end of 3 years; at a time when, in the vast majority of instances, a student either is dropped or voluntarily withdraws. This training and experience justifies, in my opinion, the time the student has spent with us.

Still a third criticism which occasionally is heard is that a large number of operations is performed by young surgeons without sufficient supervision. This, again, cannot be taken as a criticism of the system. Supervision is a function of the senior staff; and the amount given in any institution is determined by the senior staff. With us the supervision of the younger group is deemed adequate. In the years 1935 and 1936, 3049 operations were performed by the Resident staffs with a mortality rate of 1.4%.

RESEARCH. With the opening of the combined institutions in September, 1932, it was necessary that the members of the department occupy themselves primarily with caring for the sick and in organizing and conducting the teaching of surgery to medical students. These were no inconsiderable tasks and completely occupied the time of the staff. Research, and particularly experimental research, was of necessity curtailed during the first two years of the department's existence. Since then, however, research in the department steadily has grown until at the present time our facilities for prosecuting it have become inadequate.

A review of the five year period shows that 358 papers have been published by members of the department. They include clinical and experimental studies and addresses pertaining to surgery.

(a). **CLINICAL.** The list of published clinical studies numbers 261. Grossly divided, 159 studies are on subjects pertaining to general surgery and orthopedic surgery, 62 to Urology, 20 to Ophthalmology and 20 to Otolaryngology. Since many of the members of the surgical staff have affiliations with other hospitals, the incentive and material for 82 studies derive in greater or lesser part from other hospitals. Analyzed from the viewpoint of subjects studied, general surgery shows 9 papers devoted to diseases of the brain and spinal cord, 11 to the thyroid and parathyroid glands, 24 to diseases of the chest, 7 to diseases of the breast, 2 to appendicitis, 1 to acute abdominal conditions in childhood, 3 to wounds of the abdomen, 12 to diseases of the gallbladder and bile ducts, 16 to diseases of the stomach and duodenum, 7 to diseases of the intestines, 4 to diseases of the rectum and anus, 5 to hernia, 6 to cancer and other tumors, 16 to diseases of the bones and joints and 33 to miscellaneous diseases.

The 102 clinical papers originating in the subdepartments of Urology, Ophthalmology and Otolaryngology also cover a wide range of diseases in these specialties.

(b) **EXPERIMENTAL.** The list of published experimental studies numbers 69. Some of the experimental work has been done in the laboratory of Experimental Surgery of the combined institutions, some in the laboratory of Surgical Pathology and some in the wards of the hospital. Twenty-four of these experimental studies were made wholly or in part in the laboratories and wards of other hospitals. Of the 69 papers, 58 pertain to general surgery, 11 to the specialties in surgery.

(c) **ADDRESSES.** These number 28.

To attempt to analyze and appraise this mass of work would take me far beyond the scope of this report. The publications are listed in Appendix A which may be consulted by those interested. Glancing over the list the question no doubt will arise in the minds of some, whether research in the department is directed along any specific lines or whether it is undirected in the sense that members of the staff may study such problems as interest them. In answer to this question it may be said that certain research is being directed along certain lines, that other research up to the present time largely has been left to the initiative of the members of the staff. Some comments upon our re-

search program and upon the further development of research which we contemplate follow.

It must be obvious that in a department of the size and complexity of the surgical department with the variety of activities involved in the care of the sick, teaching and research, there inevitably are men with different capabilities. It is rare to find men who combine equal preeminence in organization, clinical surgery, teaching and research; it is much more common to find men of ability in one or two directions, of less ability in other directions. It is the function of the head of the department to utilize to the greatest extent each man's outstanding abilities, and to stimulate the development of his lesser abilities. In the development of research in a newly organized department one must begin by encouraging the types of research which the members of the staff are capable of doing; and with the goal in view of eventually developing the highest type of research.

As has been pointed out, the department is still in the process of development and this applies to its research. Under existing conditions, it recognizes that three general types of research may be carried on. The first of these is the so-called pure clinical research consisting in the careful analysis of various groups of cases from the viewpoints of etiology, pathology, clinical manifestations, diagnosis, treatment and results. It is a type of research which is absolutely essential to the conduct of a department. It is the most effective way of informing a department of the quality of the treatment of its patients; but in addition it may bring out new facts regarding the pathology of disease, suggest new methods in diagnosis and new ideas regarding treatment. It may serve to define problems for experimentation either in the laboratory of experimental surgery or in the wards of the hospital. The organization of the department is such as to facilitate this type of research. The completeness and accuracy of hospital records, the close association with the X-ray department and various laboratories and the efficiency of our surgical "follow-up" department enables us satisfactorily to review and study our clinical material. A glance at the department's publications shows that the majority is the result of this form of research.

A second type of investigative work which may be carried out in a surgical department is that which may best be prosecuted in the laboratories of experimental surgery and surgical path-

ology. In the experimental laboratory problems arising from the observation of patients may be studied in experimental animals with greater chances of success because the experiments can be controlled. Diseases reproduced in animals may be studied, and methods of treatment tried before their application to patients. Discoveries in the fundamental sciences of medicine may be applied to the study and treatment in animals comparable to those encountered in patients. New surgical procedures or modifications of those now in use can be used on animals and their value established before being employed in patients. It is a type of research which has advanced greatly the understanding of disease as it occurs in the human subject. Investigation of this type has been limited in its scope because of lack of funds and facilities, but a very sound beginning has been made. A program of experimental work to study the most frequent causes of death on the surgical service has been followed for the past 4 years. It has involved the study of shock in relation to trauma, of toxemia in infections and intestinal obstruction and of the factors concerned in hemorrhage particularly in association with jaundice. The results of some of these have been published. Other problems investigated include a study of the relation of the pituitary gland and pancreas to carbohydrate metabolism, of the relation of the circulation within the thyroid gland to the development of nodular goiter and so forth. Many technical problems having to do with improving methods of treatment have been studied including total gastric resection, transplantation of the ureters and suture of wounds in parenchymatous organs. The studies on total gastric resection have led to a study of the development of certain types of anemia. In the surgical pathological laboratory studies of the nature of tumors, of certain diseases of the blood and of the factors concerned in the diagnosis of abnormal serous fluids have been made and published.

A third type of research is a combination of clinical and experimental research. In this type the patients themselves are the subjects of investigation on the wards and in the laboratories, the investigations being extended and controlled by the experiments on animals. It is to this type of research that one must look for the solution of certain pressing problems in medicine and surgery since diseases as seen in the human subject cannot often be reproduced with complete accuracy in labora-

tory animals nor can the results of operation or other therapeutic procedures in animals be applied with complete confidence. Examples of this type of research include our studies on postoperative pulmonary embolism, on variations in the chemical constituents of the blood in jaundice and severe liver damage associated with hemorrhage, on anesthesia and on hypertension. The first three are included in our program of research which has had as its object the attempt to reduce the primary mortality of patients subjected to operative therapy.

In order to extend the second and third types of research which have been described, there should be in a department a sufficient number of men trained in surgery who not only are capable of recognizing the problems to be solved but who possess the background and the time necessary to undertake their solution; adequate laboratory facilities, and a budget for research. The department has men capable of prosecuting these types of research but it must be said that they are at present so burdened with routine work as to have little time for investigation; it has laboratories of surgical pathology and experimental surgery but no bacteriological or chemical laboratories; it does not have an adequate budget for research. There is great need for an expansion of facilities for research. These will be pointed out in the following pages.

BUDGET. The present budget for the surgical department is not only inadequate but not ideally set up to meet the needs of the department. With the original budget apparently secure, the Head of the department began in 1931, the organization of general surgery before undertaking the organization of the specialties in surgery. But reservations in the budget were set aside for the development of the specialties which, if we had them today, would be adequate. The organization of general surgery was far advanced and commitments made when the reduction in the original budget occurred. An examination of the reduced budget showed that certain items were carried over from the old Cornell surgical budget which it was thought best to continue to carry. For 5 years the department of surgery has attempted to carry on with a budget which is not, in the opinion of the Head of the department, properly distributed to achieve the best results.

An analysis of the budget shows that 77 percent is devoted to salaries, 9.7 percent to clerical help, 5.7 percent to technician

help, 4.1 percent to supplies including those for all research and 4.4 percent* to the Cornell surgical service at Bellevue Hospital. Comments on some of these items follows:

(a) SALARIES. Of the salary budget, 85.5 percent is paid to Full Time members of the department, 5.1 percent to part time members and 9.3 percent to the resident staff. The salaries paid to full time members of the department include salaries paid in the departments of surgical pathology and experimental surgery which constitute 22.6 percent of the total salary budget. An examination of the salary budget shows that certain items might be changed or eliminated without detriment to the department; indeed, to the advantage of the department if the funds could be diverted elsewhere. The salaries paid the resident staff seem a necessity not only from the viewpoint of the support of its members but from the viewpoint of meeting competition with other institutions. Since the resident system is embodied in our educational program, it would appear desirable to consider such salaries as fellowships in surgery.

(b) SUPPLIES. The fund for supplies making up 4.1 percent of the departmental budget includes items for supplies for all offices in the department, for surgical pathology, for the subdepartments of surgery, for the artist and photographer, for the purchase of medical journals and for research. In spite of the most rigid economy in the maintenance of offices, laboratories and so forth, the amount left for the prosecution of research in the experimental laboratory and hospital is pitifully small. As an outside figure it represents \$2500.00 a year; and of this amount about \$500.00 must be devoted to routine teaching in the experimental laboratory. The item in the budget devoted to research is not inconsiderable for almost 20 percent of the available departmental funds are devoted solely and specifically to research in the experimental laboratory. Of the amount, however, 60 percent is paid in salaries and 28.3 percent to technicians and animal caretakers; leaving 11.7 percent for supplies and equipment. We have, in fact, a fairly numerous and highly paid personnel whose sole preoccupation is research without the funds to prosecute it.

(c) BELLEVUE SERVICE. The item which constitutes 4.4 percent of the departmental budget secures secretarial and technician help for the Second Surgical Division and thereby

greatly aids the surgical staff in the care of Bellevue Hospital patients. More effective teaching and research would be possible if this amount were increased.

COMMENT. While it may be true that a rearrangement of the present departmental budget would make it more effective, no rearrangement would make it adequate for the surgical department. It might be made adequate for general surgery alone if fellowships for graduate students (resident staffs) could be obtained elsewhere; but not for the specialties in surgery. These are very much in need of development and each should have a budget for such development. After an experience of 5 years, all part time heads of these subdepartments have concluded that a full time associate in each subdepartment is practically a necessity; all have also concluded that graduate teaching in each, through a resident group, is highly desirable. In their conclusions I thoroughly agree. The approximate cost of these developments is shown in Appendix B.

DISCUSSION. Description of the facilities of the department and statements regarding its care of patients, its teaching program and research activities have been made in preceding pages. It is evident that the department is still in a period of development; a development which has proceeded to a greater extent in general surgery than in the specialties of surgery. It is highly desirable to attempt at this time further development of the department so that it may become a well-rounded unit best adapted for the care of patients, for teaching and research. From the foregoing study it is possible to point out the needs of the department which, if satisfied, will contribute toward the development of such a well-rounded unit. These may be discussed under the following headings:

1. FACILITIES. (a) HOSPITAL. (1) It is clearly desirable to open the East half of Floor 8 for an Orthopedic unit. The 10 orthopedic beds on Floor 7 cannot now accommodate the patients coming to the orthopedic O.P.D. who should be hospitalized. Nor can they provide adequately for both undergraduate and graduate teaching. (2) It is desirable to open the Children's surgical ward of 23 beds on Floor 7. The care of surgical children in adult wards is becoming increasingly difficult as their numbers increase. The participation of the Pediatric de-

partment in their care would be facilitated if the children were housed in a unit which is adjacent to that department.

(b) LABORATORY. (1) The quarters for housing laboratory animals should be increased. With the increase in our research activities we find that quarters for housing animals are totally inadequate for general surgery alone. Experimental investigation in the specialties of surgery has just begun and thus far has been confined to Urology. The lack of adequate quarters for animals is hindering and will continue to hinder research in the entire department.

II. CARE OF PATIENTS, TEACHING AND RESEARCH. These activities in a teaching institution are not readily separable and may be discussed together.

(1) The pavilion beds in general surgery and the specialties in surgery should, as nearly as possible, be kept filled particularly during the school year; not only from the viewpoint of serving the community to the greatest extent, but from that of the most effective undergraduate and graduate teaching. This largely is an economic problem of which the hospital is aware but which it finds difficult to meet at the present time.

(2) The patient clientele in the O.P.D. should be increased up to the capacity of the physical plant and the professional and nursing services. The constant pressure on the part of organized medicine to reduce the fees derived from O.P.D. patients contributes to the difficulties of educational institutions in providing material for teaching and research in so far as it lowers their incomes. One way to meet the situation is to increase the number of patients in the hospital and O.P.D.

(3) There should be provided from 15 to 20 endowed beds for clinical research. Clinical investigation is more effective if it can be carried on intensively upon groups of patients with the same disease process. When the admission of patients to the hospital is determined by economic and other considerations, a piece of clinical investigation may unduly be prolonged due to lack of material for study.

(4) The specialties in surgery should be developed. As previously has been stated, all part time heads of these sub-departments, after an experience of five years, have concluded that a full time associate in each is highly desirable; all have also concluded that graduate teaching in each, through a resi-

dent group is desirable. Development along these lines is impossible within the departmental budget, for each subdepartment would require from \$10,900. to \$11,500.00 a year, a total yearly outlay for the specialties of about \$45,000.00.

(5) In addition to the expansion of animal quarters, the department needs a budget of \$10,000.00 per year for research. It has been pointed out in my analysis of the departmental budget that funds available for the purchase and care of animals, for equipment and supplies and for technician help are so small as to render almost impossible the prosecution of research except through grants from Foundations. While the financing of research through grants is highly desirable, we should have within the departmental budget a basic fund for research.

(6) Each year the need of a chemical laboratory for studying the chemical aspects of surgical problems has become more apparent. The surgical department has a sufficiently large and well-designed laboratory which, however, thus far has been utilized only for calcium studies in a particular project supported by special funds. It is our belief that a chemical laboratory equipped and staffed to meet our needs could be maintained for \$8750.00 per year.

(7) The need for a bacteriological laboratory is as urgent as the need of a chemical laboratory. Again we have the laboratory but no funds with which to put it in operation. A sum of \$7500.00 per year would be required for this purpose.

(8) A number of fellowships in the department is highly desirable. As has been pointed out in describing our educational program, we have at present 20 advanced students in general surgery, 2 in urology and 1 in Ophthalmology and Otolaryngology - a present total of 23. With the further development of the department, this number would be increased to 27 or 28. Fellowships ranging from \$500.00 to \$1000.00 per year should be available for the support of graduate resident students in the hospital during their period of instruction, fellowships of \$1500.00 to \$2500.00 for young practitioners of surgery living outside the hospital.

The needs of the department above outlined and the sums involved are, perhaps, more clearly set forth in Appendix B.

APPENDIX A.

Publications from the Surgical Department and the Surgical Specialties.

From September 1, 1932 to September 1, 1937.

ADDRESSES ON SURGERY AND SPECIAL SUBJECTS

ADAIR, FRANK E.

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The Value of a Social Service Department in a Hospital. 50th Anniversary Book, Memorial Hospital.

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The Relation of Pathology to Surgery in the Cancer Problem. *N. Y. State J. M.* 34:602, 1934.

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Criticism of Routine Laboratory Methods in Modern Institutions. *Am. J. Clin. M.* 7:251, 1937.

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Teaching of Surgery in University Clinics. *J. Am. Coll.* 8:205, 1933.

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Graduate Teaching of Surgery in University Clinics.

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The Education of a Surgeon. *Surg., Gyn. & Obstet.* 64:570, 1937.

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Bull. N. Y. Academy 12: 14, 1936.

Medicine and Mankind. Appleton Century Company, 1936.

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The New York Eye and Ear Infirmary. *Arch. Ophthalmol.* 14:896, 1935.

Deficiencies in Training in Anatomy and Pathology of the Eye.

Bull. Acad. Ophthalmol. & Otolaryng. 21, 1935.

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John Kearney Rogers. *N. Y. Hospital Bulletin,* 1936.

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Traumatic Ulnar Neuritis. *Annals Surg.* 97: 425, 1935.
- ADAIR, FRANK E.
Tumors of the Peripheral Nervous System. In Press.
- KING, JOSEPH E. J.
Brain Abscess; external rupture of abscess with pericapsular necrosis.
Annals Surg. 101:190, 1935.
- JONES, MARVIN F.
Phases of Otolaryngology of Interest to the General Practitioner.
N. Y. State J. M. 35: 169, 1935.
- MAHONEY, WILLIAM DeG.
Further Notes on Retrobulbar Neuritis due to Thallium Poisoning.
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Surgery of the Pituitary. (with Heuer, G. J.)
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 J. Thorac. Surg. 3: 560, 1934.
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Sarcoma of the Stomach.* (with McNeer, G.)

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APPENDIX B.

ITEMIZED NEEDS OF THE DEPARTMENT

1. ENDOWED HOSPITAL BEDS. 15 to 20. The Hospital Administration states that a sum of \$1,800.00 per year will provide for the study and care of patients occupying 1 hospital bed during 1 year. Those interested in research in Surgery might either provide the amount for one year or more, or create an endowment, the income of which would provide the amount indefinitely.

2. FURTHER DEVELOPMENT OF RESEARCH.

Budget for the Purchase of Animals, Animal Care, Supplies, Equipment, Technicians.	\$10,000.00
Enlargement of Animal Quarters	7,000.00

Plans for the alteration of the animal quarters have been drawn. The estimated cost is approximately \$7,000.00. The plans call for alterations in the physical plant. Such alterations have not yet been approved (September 1937) by the Board of Governors.

3. FELLOWSHIPS.

(a) General Surgery.

2 Fellowships of \$1000.00 each	\$2000.00
4 Fellowships of 600.00 each	2400.00
8 Fellowships of 500.00 each	4000.00
1 Fellowship of 2500.00	2500.00
1 Fellowship of 2000.00	2000.00
4 Fellowships of 1500.00 each	6000.00

(b) Urology

1 Fellowship of 900.00	900.00
1 Fellowship of 600.00	600.00

(c) Orthopedics

1 Fellowship of 900.00	900.00
1 Fellowship of 600.00	600.00

(d) Otolaryngology

1 Fellowship of 900.00	900.00
1 Fellowship of 600.00	600.00

(e) Ophthalmology

1 Fellowship of 900.00	900.00
TOTAL	\$24,300.00

Of the amount desirable for Fellowships, the departmental budget is now carrying \$7700.00, the Hospital \$1000.00.

4. DEVELOPMENT OF SPECIALTIES IN SURGERY.

(a) Urology. 1 Full time Associate (Salary beginning at \$5000.00 and increasing to \$7500.00)	\$7500.00
1 Resident (this item included under Fellowships)	900.00
1 Asst. Resident (this item included under Fellowships)	600.00
1 Secretary	1500.00
Budget for Supplies & Equipment	1000.00
TOTAL	\$11,500.00

(b) Orthopedic (as in Urology above)	\$11,500.00
(c) Otolaryngology (as in Urology above)	11,500.00
(d) Ophthalmology (as in Urology above with omission of Assistant Resident)	10,900.00
TOTAL for All Subdepartments	\$45,400.00

5. CHEMICAL LABORATORY.

1 Chemist - Director - Salary	\$5000.00
2 Technicians at \$1250.00	2500.00
Supplies and Upkeep	1250.00
TOTAL	\$8750.00

6. LABORATORY FOR BACTERIOLOGY.

1 Bacteriologist - Director - Salary	\$5000.00
1 Technician	1250.00
Supplies and Equipment, etc.	1250.00
TOTAL	\$7500.00

